

THOROUGHFARE BAY, N. C.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON
PRELIMINARY EXAMINATION AND SURVEY OF THOROUGHFARE
BAY, N. C., FROM CORE SOUND TO CEDAR BAY NEAR THE MOUTH
OF NEUSE RIVER, PAMLICO SOUND.

JULY 20, 1914.—Referred to the Committee on Rivers and Harbors and ordered to
be printed, with illustration.

WAR DEPARTMENT,
Washington, July 17, 1914.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated July 16, instant, together with copies of reports from Maj. H. W. Stickle, Corps of Engineers, dated October 8, 1913, and April 11, 1914, with map, upon a preliminary examination and survey, respectively, of Thoroughfare Bay, N. C., from Core Sound to Cedar Bay, near the mouth of Neuse River, Pamlico Sound, made by him in compliance with the provisions of the river and harbor act approved March 4, 1913.

Very respectfully,

HENRY BRECKINRIDGE,
Acting Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, July 16, 1914.

From: The Chief of Engineers, United States Army.

To: The Secretary of War.

Subject: Preliminary examination and survey of Thoroughfare Bay, N. C.

1. There are submitted herewith, for transmission to Congress, reports dated October 8, 1913, and April 11, 1914, with map, by Maj. H. W. Stickle, Corps of Engineers, on preliminary examination and survey of Thoroughfare Bay, N. C., from Core Sound to Cedar Bay near the mouth of Neuse River, Pamlico Sound, authorized by the river and harbor act approved March 4, 1913.

2. Thoroughfare Bay is on the north side of Core Sound, about 6 miles west of the end of the peninsula at the junction of Core and Pamlico Sounds. The improvement contemplated is the deepening of portions of an existing waterway about $1\frac{1}{2}$ miles in length connecting Thoroughfare Bay and Cedar Bay, which is now used when tides permit by vessels plying between Core Sound and Pamlico Sound. Except when the tides are favorable, these vessels are now obliged to use the route north of Harbor Island, where the depth is also deficient and the passage rough and dangerous. Several small communities, having an aggregate population of about 2,000, principally engaged in fishing and oystering, would be benefited by the desired improvement. The district officer presents a plan which provides for a channel 5 feet deep and 50 feet bottom width, at an estimated cost of \$5,200 and \$300 annually for maintenance. He expresses the opinion that the locality is worthy of improvement to this extent, and the division engineer concurs in this view.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated June 30, 1914, concurring with the views of the district officer and the division engineer.

4. After due consideration of the above-mentioned reports, I concur with the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors, and therefore report that the improvement by the United States of Thoroughfare Bay, N. C., is deemed advisable to the extent of providing a channel 5 feet deep and 50 feet bottom width connecting Thoroughfare Bay and Cedar Bay, N. C., at an estimated cost of \$5,200 for first construction and \$300 annually for maintenance. The full amount of the estimate should be provided in one appropriation.

DAN C. KINGMAN,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS
ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
June 30, 1914.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. These reports cover preliminary examination and survey of Thoroughfare Bay, N. C., from Core Sound to Cedar Bay, near the

mouth of Neuse River, Pamlico Sound, provided for by the act of March 4, 1913.

2. The improvement contemplated is the deepening of portions of an existing waterway about $1\frac{1}{2}$ miles in length connecting Thoroughfare Bay and Cedar Bay, which is now used when tides permit by vessels plying between Core Sound and Pamlico Sound. There is fairly good depth in the Thoroughfare, but it is quite shallow at either end.

3. Core Sound in this vicinity and extending northward off Harbor Island is a prolific oyster ground, and during the season large quantities are carried to Newbern and Washington for market or shipment. Except when the tides are favorable, the vessels engaged in this trade must pass to the north of Harbor Island, where the channel is also deficient in depth, and the prevailing northerly winds at that season render this route rough and dangerous. The distance by way of the Thoroughfare is less than by the Harbor Island Bar route. Several small communities, having an aggregate population of about 2,000, whose principal means of livelihood is fishing and oystering, would be benefited by the proposed improvement. The country adjacent has been developing agriculturally in recent years, and the district officer states that while the improvement might not result in a permanent increase in the commerce in oysters, there is a strong probability that it would hasten the agricultural development and materially increase the commerce from this source. There are 463 boats of all kinds owned by the inhabitants in the locality, and the district officer states that fully 50 per cent of all the commerce would pass over this waterway if it had the opportunity to do so.

4. A plan of improvement is presented which provides for a channel 5 feet deep and 50 feet bottom width, at an estimated cost of \$5,200 and \$300 annually for maintenance. The district officer and the division engineer are of opinion that the locality is worthy of improvement to this extent.

5. In addition to the information furnished by the district officer the board has had the benefit of statements and arguments submitted at a public hearing held at its office this date, which was attended by Hon. John H. Small, M. C., Hon. John M. Faison, M. C., and a delegation of citizens from the locality, all of whom appeared in behalf of the proposed improvement.

6. While the commerce involved is not large in tonnage, it is of considerable importance and value, and the only means of getting it to market is by water. Much of it is of a perishable nature, and quick transit is desirable. The proposed improvement would afford a shorter, quicker, and safer route than the existing one to the north of Harbor Island and would be of material benefit to this isolated community. The cost of the work is moderate, and the board believes the resulting benefits would be sufficient to justify the expenditure proposed. It therefore reports in concurrence with the views of the district officer and the division engineer that it is advisable for the United States to undertake the provision of a channel connecting Thoroughfare Bay and Cedar Bay 5 feet deep and 50 feet bottom width at a first cost of \$5,200 and an annual charge for maintenance of about \$300 thereafter. The total estimated first cost should be made available in one appropriation.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

FREDERIC V. ABBOT,
Colonel, Corps of Engineers,
Senior Member Present.

PRELIMINARY EXAMINATION OF THOROUGHFARE BAY, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., October 8, 1913.

From: The District Engineer Officer,

To: The Chief of Engineers, United States Army
(Through Division Engineer).

Subject: Preliminary examination report, Thoroughfare Bay, N. C.

1. This is a report upon the preliminary examination of "Thoroughfare Bay, N. C., from Core Sound to Cedar Bay, near the mouth of Neuse River, Pamlico Sound," provision for which was made in the river and harbor act approved March 4, 1913. The duty of making this preliminary examination was assigned to me by department letter of March 18, 1913.

2. Asst. Engineer Harry T. Paterson, in local charge of the Newbern field office of this district, submits the following report:

"Thoroughfare Bay is on the north side of Core Sound, about 6 miles west of the end of the peninsula formed by the junction of Core and Pamlico Sounds. It lies about 30 miles by the boat route through Core Sound easterly from Beaufort, N. C. Hunting Quarters, or Atlantic, is the nearest post office, and lies about 2½ miles west of the entrance to the bay. Coast chart No. 146 of the United States Coast and Geodetic Survey shows the location with respect to Beaufort and Core Sound points. At the west end of Thoroughfare Bay there is a ditch averaging about 200 feet wide and 5 feet deep, which extends for a distance of about 1½ miles through the marsh to the head of Cedar Bay and bears evidence of having been cut through by hand at some remote date. Local tradition has it that this work was done by the Indians. Cedar Bay opens on the south side of Neuse River. Its mouth is 29 miles easterly from Newbern and 53 miles southerly from Washington, N. C. * * * There is some navigation through this waterway at present, it being used, whenever the tide is high enough to permit of passage, by boats plying between Newbern or Washington and Core Sound points, and by vessels engaged in oystering. The commerce thus carried is necessarily small, due to the conditions of draft at either end. * * * That portion of Pamlico Sound lying off Harbor Island is a prolific oyster ground and during the oyster season practically the entire population of Core Sound points are employed on vessels which, with others from Pamlico Sound points, are engaged in dredging oysters there. The best of these oysters are taken to Washington, Newbern, Morehead City, and Beaufort, while the smaller varieties

are used by the canning factories at Wit and Beaufort. The northerly winds prevailing during the oyster season frequently render passage from Pamlico Sound to Core Sound via Harbor Island Bar exceedingly rough and dangerous, and it is a frequent occurrence for these oystermen to have to make a harbor and wait for two or three days before they can make the passage. It was also urged at the hearing that the cut would afford a considerable saving in distance in the transportation to and from Core Sound points. By the present route from Atlantic to Newbern by way of Beaufort the distance is 71 miles, from Atlantic to Newbern by way of Harbor Island is 69 miles, while from Atlantic to Newbern by way of the Thoroughfare is 58 miles. The commerce from Core Sound points consists principally of fish, oysters, clams, and sweet potatoes, the imports being groceries, hardware, and dry goods. There are probably 500 men, in addition to the normal population of Core Sound, employed on the oyster fleet in season, who get most of their supplies in the vicinity. There is some excellent agricultural ground bordering on Core Sound. * * * There is also a large amount of available timber which could be brought to market if the improvements were made. This waterway was subject to a previous examination, and a report was submitted by Capt. Earl I. Brown, Corps of Engineers, dated May 29, 1909. The previous examination contemplated, in addition to the present channel, a further extension by the way of Long Bay through an old canal to Turnagain Bay, the report thereon being unfavorable to the improvement. The least depth shown on the inclosed map¹ is 1 foot at the eastern end of the Thoroughfare, and in order to make a depth of 4 feet available dredged cuts aggregating 3,500 feet in length, varying in depth from 0 to a maximum of 3 feet, will have to be made. There are no lunar tides at this point, variations in the level of the water surface being due entirely to the action of the wind. Ordinary storms will cause a variation of 1 foot above or below mean stage, while severe storms may cause a variation of as much as 3 feet."

3. The locality and conditions are shown on map¹ which is herewith prepared in connection with this examination. It will be noted that the only obstacles to 4-foot navigation through this waterway are the two shoals at the eastern and western ends of the thoroughfare and three lumps in the channel between these points. The locality was examined and a hearing was held at Atlantic, N. C., on June 26, 1913, which was attended by from 150 to 200 interested parties. At this hearing it was developed that the desire of the parties interested was to have a channel not less than 5 feet deep (the prevailing depth in Core Sound) and 60 feet wide through this thoroughfare. It was stated that this channel would be of benefit to all the communities on Core Sound east of Harkers Island, namely: Marshallberg, Stacy, Wit, Davis, Roe, and Atlantic, having an aggregate population of about 2,000, whose principal means of livelihood is in fishing and oystering. It is claimed that if the improvement were made, the oyster factory at Wit will be enlarged, with a consequent increase in the commerce in oysters to that point. It was stated that the oyster factories could not be located nearer to the oyster grounds, as labor could not be obtained there for their operation.

¹ Not printed.

4. It is not believed that any great permanent increase of the commerce in oysters will result from the proposed improvement, as conservation of the oyster beds is not practiced. There is, however, a strong probability that the improvement would hasten the agricultural development, and a greatly increased commerce should result from this source.

5. Harbor Island Bar is reported to have filled up until there is now but about 4 feet of water at low tide. It was stated at the hearing that many vessels have foundered there in rough weather, and that several lives and thousands of dollars have been lost. It was set forth that it is impracticable for the commerce of Core Sound to use the inland waterway now in going north and that shipping is required to use the Harbor Island Bar or the thoroughfare when the tide makes the water such that shipping can get through there. The impracticability of improving and maintaining Harbor Island Bar in lieu of the locality under consideration on account of the shifting sandy bottom was set forth.

6. The annual products shipped away from the communities most vitally interested in the proposed improvement was submitted at the hearing as follows:

Straits:		Total shipped away:	
Sweet potatoes..bushels..	90,000	Sweet potatoes.....bushels..	225,000
Irish potatoes....barrels..	500	Irish potatoes.....barrels..	1,565
Marshallberg:		Oyster shells.....bushels..	170,000
Sweet potatoes..bushels..	50,000	Salt fish.....barrels..	5,100
Irish potatoes....barrels..	700	Fish scrap.....tons..	500
Oyster shells....bushels..	10,000	Shad oil.....barrels..	400
Salt fish.....barrels..	200	Cotton.....pounds..	30,000
Smyrna:		Cooked oysters.....cases..	60,000
Irish potatoes.....do....	65	Fresh fish.....pounds..	1,893,750
Fish scrap.....tons..	500	Lumber.....feet B. M..	800,000
Shad oil.....barrels..	400	Crushed shells.....tons..	500
Davis:		White shad.....pounds..	50,000
Sweet potatoes..bushels..	25,000	Oysters in shell....bushels..	50,000
Cotton.....pounds..	3,000	Shipments to the locality:	
Oyster shells....bushels..	3,000	Marshallberg:	
Oysters.....cases..	1,800	Oysters.....bushels..	14,000
Fresh fish.....pounds..	500,000	Merchandise.....	\$5,700
Stacy:		Smyrna:	
Sweet potatoes..bushels..	18,000	Oysters.....bushels..	21,000
Irish potatoes....barrels..	200	Merchandise.....	\$3,025
Fresh fish.....pounds..	600,000	Davis:	
Wit:		Oysters.....bushels..	65,000
Oysters.....cases..	42,000	Coal.....tons..	110
Oyster shells....bushels..	80,000	Lumber.....feet..	35,000
Lumber.....feet..	500,000	Wire fencing.....coils..	100
Crushed shells.....tons..	5,000	Fertilizer.....tons..	50
Sweet potatoes..bushels..	40,000	Wood.....cords..	85
Salt fish.....barrels..	600	Merchandise.....	\$15,000
Fresh fish.....pounds..	400,000	Stacy:	
Atlantic:		Fertilizer.....tons..	75
Salt fish.....barrels..	1,500	Merchandise.....	\$14,000
Lupton and Roe:		Wit:	
Irish potatoes.....do....	100	Oysters.....bushels..	151,000
Sweet potatoes..bushels..	2,000	Wood.....cords..	500
Lumber.....feet..	300,000	Coal.....tons..	190
Salt fish.....barrels..	1,000	Fertilizer.....do....	50
Oysters in shells.bushels..	50,000	Merchandise.....	\$40,000
Fresh fish.....pounds..	393,750	Atlantic:	
White shad.....do....	5,000	Oysters.....bushels..	117,005

Atlantic—Continued.

Wood.....cords..	690
Merchandise.....	\$40,936
Fresh fish.....pounds..	1,211,250
Gasoline engines.....	\$3,000
Lupton and Roe:	
Merchandise.....	\$10,000
Total receipts:	
Oysters in shell.bushels..	368,000

Total receipts—Continued.

Merchandise.....	\$131,661
Coal.....tons..	300
Lumber.....feet..	35,000
Wire fencing.....coils..	100
Fertilizer.....tons..	175
Wood.....cords..	1,275
Fresh fish.....pounds..	1,211,250

The boats of all kinds owned by inhabitants in the locality number 463. These statistics were collected by a personal canvass of a committee from Atlantic and are believed to be essentially reliable. Fully 50 per cent of this commerce would pass over this waterway if it had the opportunity to do so.

7. The proposed improvement would save the vessels about one-third of their time in going to Washington, N. C., Newbern, N. C., and Belhaven, N. C., and would save much time in going to Elizabeth City, Norfolk, and other northern points. The improvement would greatly benefit the fishermen and oystermen who live on the lower part of Core Sound and at other times than the fishing season are engaged in agriculture. The agricultural interest is increasing and there are agriculturists from elsewhere moving into this country for the purpose of farming. The soil is fertile and operations can be conducted earlier in the season than in localities of the State farther inland. This renders the locality particularly suitable for trucking if necessary transportation facilities should be provided. The opening of this waterway would probably result in prompt development of the lumber industry. There is a quantity of timber, estimated as high as 100,000,000 feet, which could be disposed of over this channel. At least 7,000 people would be benefited by the improvement.

8. The reasons why some improvement seems justifiable are:

(a) No safe water outlet for the locality to the north now exists and one is necessary to provide for the needs of existing commerce.

(b) This route seems to be the only one practicable for improvement; on account of the exposed location of Harbor Island Bar and on account of its shifting sands the maintenance of a channel there would be comparatively high.

(c) The improvement of the Thoroughfare Bay-Cedar Bay Channel to a reasonable extent—4 or 5 feet depth—would be relatively inexpensive and its maintenance cost apparently small.

(d) No railroad enters this part of Carteret County east of the inland waterway.

(e) A great development of agricultural and timber industries and some extension in the fishing and oyster industries may reasonably be expected to immediately follow the execution of the proposed improvement.

9. It is my belief that the benefits to be derived from this improvement are sufficient to justify a survey, and I recommend that a survey and preparation of estimates be ordered to determine the extent to which the improvement may be desirable.

10. There are no wharves on the present waterway, and, as it is only a part of a through waterway, none are deemed necessary.

11. In connection with the improvement proposed there are no possibilities for the development and utilization of water power for industrial and commercial purposes.

12. There is no possibility of coordinating the improvement for navigation with improvements desirable for other purposes to compensate the Government for expenditures which may be made in the interest of navigation.

H. W. STICKLE,
Major, Corps of Engineers.

[Third indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
October 28, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer in recommending a survey in order to determine the extent and advisability of the improvement.

For the board:

W. M. BLACK,
*Colonel, Corps of Engineers,
Senior Member of the Board.*

SURVEY OF THOROUGHFARE BAY, N. C.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Wilmington, N. C., April 11, 1914.

From: District Engineer Officer.

To: The Chief of Engineers, United States Army
(Through the Division Engineer).

Subject: Report of survey of Thoroughfare Bay, N. C.

1. In compliance with instructions contained in department letter dated November 14, 1913, the following report of the survey of Thoroughfare Bay, N. C., from Core Sound to Cedar Bay near the mouth of Neuse River, Pamlico Sound (with plans and estimates for improvement) is submitted.

2. Assistant Engineer Harry T. Paterson, to whom the immediate charge of this survey was assigned, reports as follows:

A survey party under Junior Engineer Norman M. Chivers was in the field from January 29 to February 5, 1914. The 5-foot depth contour was developed at the head of each bay and the connecting channel sounded throughout. Hydrographic base lines were laid out with a graduated wire, from which soundings were located by measurement on lines normal thereto. These base lines constitute the horizontal control, azimuth being taken from polaris observations. None of the triangulation points of the United States Coast and Geodetic Survey was conveniently available for tying in. Vertical control was based on observations during the period of survey. The extreme variation noted was between minus 0.6 and plus 0.6, the former reading occurring during a heavy southwest wind and the latter during a heavy northeast wind.

3. There are no material changes in the physical or commercial conditions in connection with the proposed improvement to report since the preliminary examination report was submitted.

4. On the accompanying map is shown the channel projected through the shoal places at the head of either bay, which are the greatest obstacles to the navigation of the connecting channel. They are composed of mud and fine sand and are undoubtedly caused by the deposit of suspended matter due to the decrease in velocity when the water from the narrow connecting channel debouches into the wider reaches of the bays. It is expected that they will gradually fill up and will require maintenance about once in every four years. While figures for the maintenance are included in the estimates, it is expected that four such installments will be allowed to accumulate before any work of maintenance is done.

5. In addition to the cuts above mentioned, four shorter cuts are planned in the connecting channel where the project depth and width are not now available. The material to be removed in these cuts is composed of sand, clay, and oyster shells, and little, if any, maintenance would be required.

6. A channel of 50 feet, bottom width, having the side slopes of 1 on 2 and having a depth of 5 feet, was adopted for this estimate. This conforms to the limiting depth of the Core Sound channels, and the depth and width adopted are considered suitable for vessels of 4½-foot draft, for which the channel is designed.

7. The following is an estimate of the cost of this improvement:

Depth of channel	feet..	5
Cubic yards from section.....		16, 300
Cubic yards from 1 foot outside.....		13, 300
Total cubic yards to be removed.....		29, 600
Unit price.....		\$0. 16
Cost of excavation.....		\$4, 736
Engineering and contingencies.....		\$464
Total cost.....		\$5, 200
Estimated annual maintenance.....		\$300

8. As stated in the preliminary report, the necessity for public terminals is not urgent, the improvement being only a part of a through waterway.

9. As the existing outlet to the eastern end of Core Sound over Harbor Island Bar has greatly depreciated and is difficult of passage, and as its restoration and maintenance would be more expensive than the proposed improvement, it is believed that the construction of this new outlet is a project worthy of being undertaken by the General Government.

10. If the improvement be ordered, funds sufficient to cover the entire cost should be provided by the initial appropriation in order that the work may be prosecuted at the rate of 15,000 cubic yards per month.

H. W. STICKLE,
Major, Corps of Engineers.

[First indorsement.]

OFFICE DIVISION ENGINEER, SOUTHEAST DIVISION,
April 22, 1914.


To the CHIEF OF ENGINEERS:

The relatively very large amount of commerce which the report on preliminary examination states would use the improvement proposed by the district officer justifies the small expenditure necessary therefor. I therefore concur with the district officer in his conclusion as expressed in paragraph 9 within.

W. C. LANGFITT,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey see page 2.]





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CEDAR ISLAND BAY

75 76 74 58 46 44 34
63 56 57 70 54 42 42
54 56 57 61 59 46 46

Cedar Island base

AZIMUTH AND DISTANCE.

AZIMUTH IS TRUE AT TRIANGULATION STATION THOROUGHFARE 0"

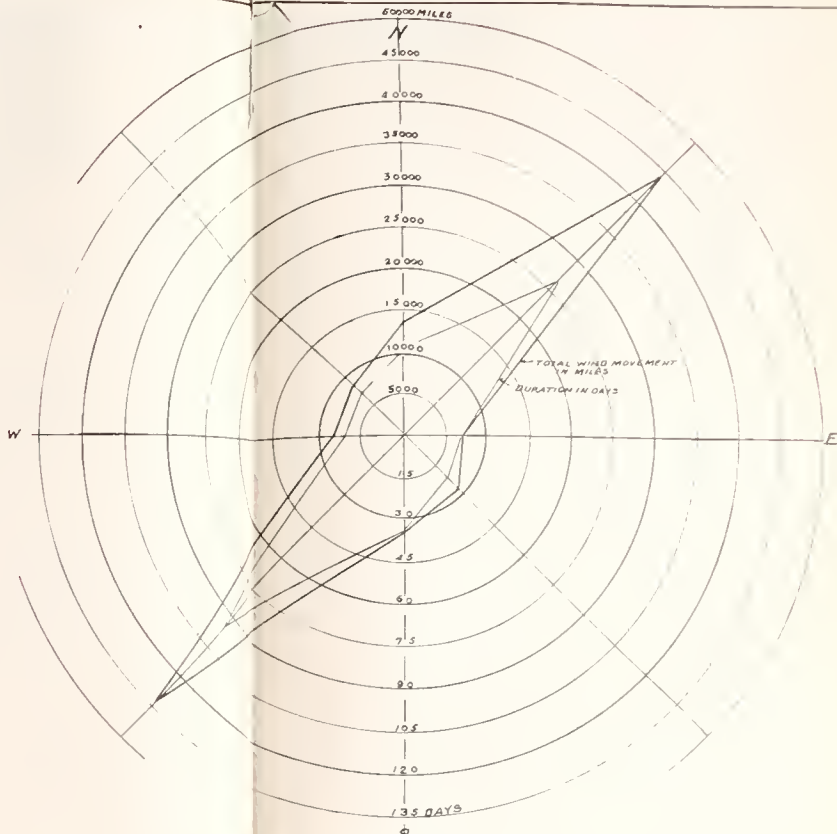
STATION	STATION	AZIMUTH	DISTANCE
THOROUGHFARE 0	THOROUGHFARE BASE	283° 08'	4400 FEET
" 0	" 1	60° 31'	1373 "
" 1	" 2	105° 04'	2272 "
" 2	" 3	104° 45'	4165 "
" 3	CEDAR ISLAND BASE	180° 50'	3985 "

VERTICAL CONTROL.

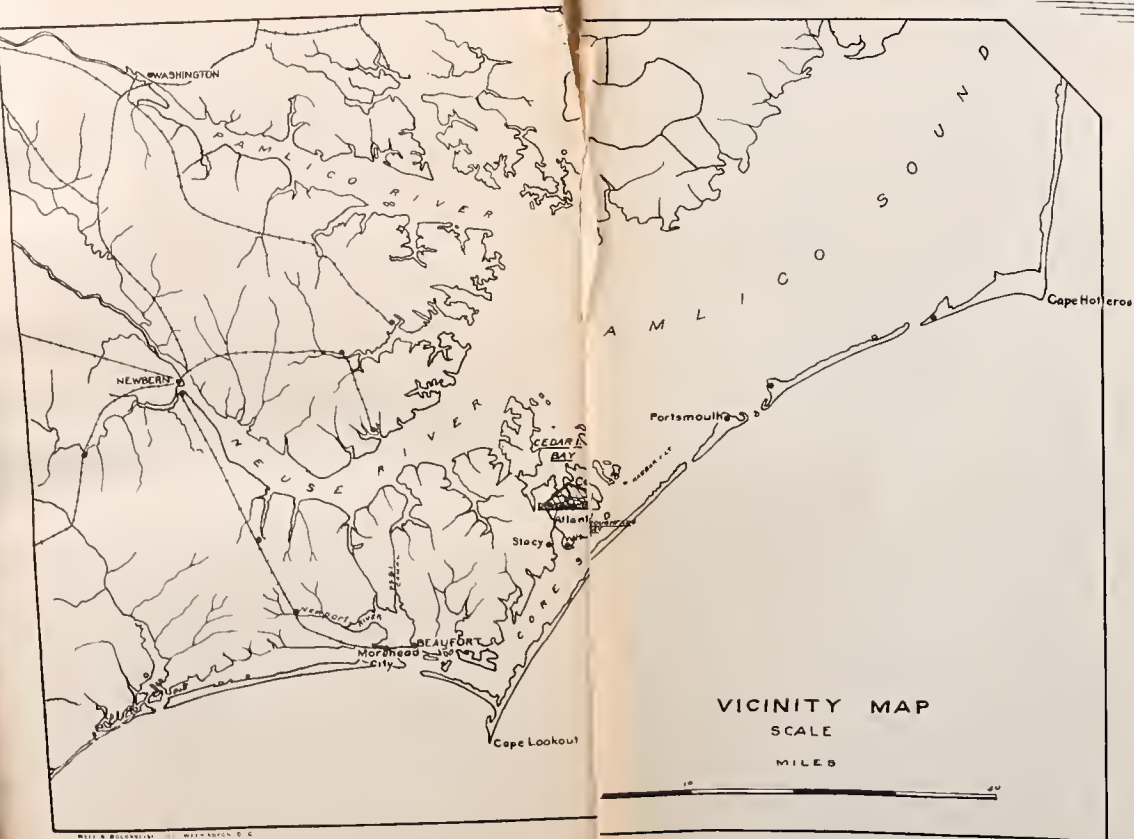
SOUNDINGS ARE IN FEET AND TENTHS AND ARE REFERRED TO MEAN DEPTH DURING MONTH OF LOWEST WATER IN THE NAVIGATION SEASON. AS FAR AS DETERMINED BY OBSERVATIONS MADE DURING THE SURVEY

DESCRIPTION.

THOROUGHFARE 0 IS A CONCRETE MONUMENT MARKED U. S. E. O 1914 EL. 072	
" 1 13 " " " " " " " 1914 EL. 101	
" 2 11 " " " " " " " 1913	
" 3 13 " " " " " " " 1914	



DIRECTION, DURATION AND TOTAL WIND MOVEMENT
COMPILED FROM THE RECORDS OF U. S. L. S. S. AT
CAPE LOOKOUT



VICINITY MAP
SCALE
MILES

Projected Channel 30 wide, 5 deep

U.S.E.O. 1913
Thoroughfare No. 2

U.S.E.O. Thoroughfare
No. 1 Elev. 11.01
-1914-

THOROUGHFARE BAY
NORTH CAROLINA.

FROM CORE SOUND TO CEDAR BAY NEAR THE MOUTH OF
NEUSE RIVER, PAMLI CO SOUND.

SURVEYED UNDER THE DIRECTION OF
MAJOR H. W. STICKLE, CORPS OF ENGINEERS, U. S. ARMY
HARRY T. PATERSON, ASSISTANT ENGINEER

FIELD WORK BY
NORMAN M. CHIVERS, JUN. ENG.
T. J. HEWITT, INSPECTOR.

OFFICE WORK BY
ALFRED VON SILLER, JUN. ENG.
NORMAN M. CHIVERS, JUN. ENG.
T. J. HEWITT, INSPECTOR

U. S. ENGINEER OFFICE, WILMINGTON, N. C.
FORWARDED TO THE CHIEF OF ENGINEERS, U. S. ARMY
WITH REPORT OF 4-11-1914

H. W. Stickle
MAJOR, CORPS OF ENGINEERS, U. S. ARMY

FEBRUARY 1 TO 5 1914

SCALE OF FEET

